^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

Adapted from a XUNDL dataset for 2020Po12 compiled by B. Singh (McMaster) on December 24, 2020.

(n,γ) E=thermal.

2020Po12: thermal neutron beam was obtained from the ILL-Grenoble reactor facility. Target was 86.7 mg, 99.6% enriched ^{64}Ni placed at a distance of 9 c.m. from the FIssion Product Prompt gamma-ray Spectrometer (FIPPS) array of eight HPGe detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin with a time window of 300 ns, $\gamma\gamma(\theta)$. Deduced levels, J, π, mixing ratios. Comparison of low-lying structure with Monte Carlo Shell Model (MCSM) calculations.

1977Is01: thermal neutrons were produced from the McMaster Nuclear Reactor. Target was 98.02% enriched ^{64}Ni. γ rays were detected with an Ge(Li)-NaI(Tl) pair spectrometer. Measured Eγ, Iγ. Deduced levels, absolute photon intensities. Report 22 transitions.

1972Co31: thermal neutrons were produced from the Brookhaven High Flux Beam Reactor (HFBR). Target was 97.92% enriched ^{64}Ni. γ rays were detected with Ge(Li) detectors. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ(t). Deduced levels, limit of isomer lifetime, absolute photon intensities. 1972Co31 also report data for ^{65}Ni β^- decay.

1971Ar39: thermal neutrons were produced from the 1-MW heavy-water reactor R1 in Stockholm. Target was 97.92% enriched ^{64}Ni. γ rays were detected with a Ge(Li) pair spectrometer. Measured Eγ, Iγ. Deduced levels, absolute photon intensities. Report 12 transitions. The authors state that the uncertainty in relative intensity is 10% strong transitions and increases successively to about 100% for weak ones.

Others: 2008He01 (%Iγ for 6035γ), 1997Ve03 (cross sections), 1971GiZL (a few primary γ rays), 1972GrZA (capture on Ni isotopes).

(pol n,γ) E=thermal.

1978Ve06: polarized neutron beam was produced from the high-flux reactor (HFR) of the Rector Centrum Nederland at Petten, Netherlands. Target was enriched ^{64}Ni. γ rays were detected with a polarization spectrometer consisting of two Ge(Li) detectors and a Permendur polarimeter. Measured Eγ, Iγ, γ(circ pol). Deduced levels, J, π.

^{65}Ni Levels

E(level)[†‡]	J$^\pi$[#]	T$_{1/2}$	Comments
0.0	5/2$^-$		
63.44 *5*	1/2$^-$	>2.1 μs	%IT=100 J$^\pi$: 1/2$^-$ from 6035γ(circ pol) (1978Ve06). T$_{1/2}$: from $\gamma\gamma$(t) in 1972Co31.
310.41 *5*	3/2$^-$		J$^\pi$: 3/2$^-$ from 5788γ(circ pol) (1978Ve06).
692.32 *5*	3/2$^-$	≈0.5 ps	J$^\pi$: 3/2$^-$ from 5406γ(circ pol) (1978Ve06). T$_{1/2}$: 2020Po12 quote reference 28 for lifetime of ≈0.7 ps (assumed here as mean lifetime) from another work to be published by M. Sferrazza et al.
1017.16 *8*	9/2$^+$		
1141.09 *11*	(5/2$^-$,7/2$^-$)		
1273.65 *15*	(5/2$^-$)		
1417.70 *7*	1/2$^-$	<208 fs	J$^\pi$: 1/2$^-$ from γ(circ pol) (1978Ve06). T$_{1/2}$: 2020Po12 quote reference 28 for lifetime of <300 fs (assumed here as mean lifetime) from another work to be published by M. Sferrazza et al.
1920.43 *8*	5/2$^+$		
2146.84 *13*	3/2$^-$		J$^\pi$: (1/2,3/2)$^-$ from γ(circ pol) (1978Ve06).
2168.78 *17*			
2324.19 *6*	3/2$^{(-)}$		
2711.23 *7*	(3/2$^+$)		
2793.00 *10*	5/2$^+$		
2901.81 *10*	(3/2)$^+$		
3014.42 *14*	3/2$^+$		
3044.25 *20*	(5/2$^+$)		
3105.67 *24*	(1/2$^-$,3/2$^-$)		
3279.39 *10*	(3/2)$^+$		

Continued on next page (footnotes at end of table)

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

^{65}Ni Levels (continued)

E(level)[†][‡]	J$^{\pi}$[#]	Comments
3410.63 *16*	(3/2$^+$)	
3451.68 *16*	(3/2$^+$)	
3509.18 *14*	(3/2$^+$)	
3962.62 *19*	(3/2$^+$)	
4001.47 *17*	(1/2$^-$,3/2)	J$^{\pi}$: (1/2$^-$) assigned in 2020Po12.
4344.64 *14*	1/2$^+$	
4391.81 *17*	(3/2)$^+$	
4508.05 *37*	(1/2,3/2,5/2$^+$)	
4544.49 *21*	(1/2$^-$,3/2)	
4655.32 *22*	(3/2)$^+$	
(6098.29 *8*)	1/2$^+$	S(n)=6098.08 *14* (2021Wa16). J$^{\pi}$: s-wave capture in 0$^+$ g.s. of ^{64}Ni.

[†] Additional information 1.
[‡] From a least-squares fit to γ-ray energies.
[#] From Adopted Levels. Arguments from this dataset are given under comments.

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

γ(^{65}Ni)

Iγ normalization: From Σ%Iγ(all primary transitions)=100.

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	α&	Comments
63.41 *7*	57	63.44	1/2⁻	0.0	5/2⁻	(E2)		3.23 *5*	%Iγ=12 E_γ: other: 63.6 *3* (1972Co31). I_γ: from 1972Co31. Intensity is not given by 2020Po12, as this γ is not seen in γγ-coin. Other: 87 *14* deduced by the evaluator from intensity balance at 63 level using α(theory)=3.23 for E2. Additional information 9. Mult.: 1972Co31 deduce α(total)≈5 from intensity imbalance, suggesting predominantly E2.
246.9 *1*	1.5 *2*	310.41	3/2⁻	63.44	1/2⁻				%Iγ=0.31 *4* E_γ,I_γ: other: 247.1 *5* with Iγ=2.2 (1972Co31). Additional information 10.
310.5 *1*	100	310.41	3/2⁻	0.0	5/2⁻	M1+E2	+0.191 *13*		%Iγ=20.6 E_γ: others: 310.5 *2* (1972Co31), 310.2 *10* (1971Ar39). Additional information 11. δ: from (5788γ)(310γ)(θ), assuming δ(M2/E1)<0.05 for 5788γ (2020Po12).
382.0 *1*	2.4 *3*	692.32	3/2⁻	310.41	3/2⁻				%Iγ=0.49 *7* E_γ,I_γ: other: 382.0 *3* with Iγ=3.0 (1972Co31). Additional information 12.
629.0 *1*	35 *5*	692.32	3/2⁻	63.44	1/2⁻	M1+E2	+0.052 *11*		%Iγ=7.2 *11* E_γ: others: 628.8 *3* (1972Co31), 629.0 *10* (1971Ar39). I_γ: others: 32 (1972Co31), 24 (1971Ar39). Additional information 13. δ: from (5406γ)(629γ)(θ), assuming δ(M2/E1)<0.05 for 5406γ. Other solution of −1.95 *6* is rejected based on unrealistic B(E2)(W.u.)≈480, deduced from mean lifetime τ≈0.7 ps (2020Po12).
692.4 *1*	6.6 *10*	692.32	3/2⁻	0.0	5/2⁻	M1+E2	+0.03 *2*		%Iγ=1.36 *22* E_γ: others: 692.2 *3* (1972Co31), 692.6 *10* (1971Ar39). I_γ: others: 6.5 (1972Co31), 4.4 (1971Ar39). Additional information 14. δ: from (5406γ)(692γ)(θ), assuming δ(M2/E1)<0.05 for 5406γ. Other solution of −5.3 *4* is rejected based on large B(E2)(W.u.)≈467, deduced from mean lifetime τ≈0.7 ps, and assumed low collectivity (2020Po12).
725.5 *3*	0.17 *2*	1417.70	1/2⁻	692.32	3/2⁻				%Iγ=0.035 *5* E_γ: other: 726 with Iγ=0.9 (1972Co31, tentative). Additional information 15.

$^{65}_{28}Ni_{37}$-3

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

γ(^{65}Ni) (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	Comments
779.3 *1*	0.009 *2*	1920.43	$5/2^+$	1141.09	$(5/2^-,7/2^-)$			%Iγ=0.0019 *4*
903.2 *1*	0.036 *4*	1920.43	$5/2^+$	1017.16	$9/2^+$			%Iγ=0.0074 *9*
906.5 *2*	0.105 *15*	2324.19	$3/2^{(-)}$	1417.70	$1/2^-$			%Iγ=0.0216 *32*
963.1 *6*	0.046 *4*	1273.65	$(5/2^-)$	310.41	$3/2^-$			%Iγ=0.0095 *9*
1017.1 *1*	0.054 *7*	1017.16	$9/2^+$	0.0	$5/2^-$			%Iγ=0.0111 *15*
1107.3 *1*	17 *2*	1417.70	$1/2^-$	310.41	$3/2^-$	M1+E2	+0.017 *8*	%Iγ=3.5 *5* E_γ: others: 1107.4 *4* (1972Co31), 1108.1 *10* (1971Ar39). I_γ: other: 16.5 (1972Co31), 15 (1971Ar39). Additional information 16. (1107.27γ)(310.45γ)(θ): A_2=+0.176 *5*, A_4=+0.001 *5*. Other solution of +1.66 *2* is rejected based on large B(E2)(W.u.)>72, deduced from mean lifetime τ<300 fs; authors assume low collectivity (2020Po12).
1140.7 *8*	0.0153 *13*	1141.09	$(5/2^-,7/2^-)$	0.0	$5/2^-$			%Iγ=0.00315 *30*
1210.2 *3*	0.031 *2*	1273.65	$(5/2^-)$	63.44	$1/2^-$			%Iγ=0.0064 *5*
1228.2 *2*	0.39 *3*	1920.43	$5/2^+$	692.32	$3/2^-$	E1+M2	−0.09 *4*	%Iγ=0.080 *7* δ: from (1229.2γ)(629.00γ)(θ): A_2=+0.09 *2*, A_4=−0.02 *3* (2020Po12).
1273.7 *3*	0.021 *2*	1273.65	$(5/2^-)$	0.0	$5/2^-$			%Iγ=0.0043 *5*
1290.1 *5*	0.0184 *14*	4001.47	$(1/2^-,3/2)$	2711.23	$(3/2^+)$			%Iγ=0.00379 *34*
1293.6 *1*	0.53 *5*	2711.23	$(3/2^+)$	1417.70	$1/2^-$			%Iγ=0.109 *12*
x1346.0[a] *10*	6.9							%Iγ=1.4 E_γ,I_γ: from 1971Ar39 only. Additional information 2.
1359.1 *4*	0.016 *2*	3279.39	$(3/2)^+$	1920.43	$5/2^+$			%Iγ=0.0033 *5*
1417.7 *2*	0.98 *11*	1417.70	$1/2^-$	0.0	$5/2^-$			%Iγ=0.202 *25* E_γ: others: 1418 with Iγ=0.9 (1972Co31, tentative). Additional information 17.
1437.6 *5*	0.016 *2*	2711.23	$(3/2^+)$	1273.65	$(5/2^-)$			%Iγ=0.0033 *5*
1442.9 *8*	0.23 *2*	(6098.29)	$1/2^+$	4655.32	$(3/2)^+$			%Iγ=0.047 *5*
1454.5 *2*	0.88 *9*	2146.84	$3/2^-$	692.32	$3/2^-$			%Iγ=0.181 *20*
1490.0 *4*	0.0098 *15*	3410.63	$(3/2^+)$	1920.43	$5/2^+$			%Iγ=0.00202 *32*
1531.3 *6*	0.011 *2*	3451.68	$(3/2^+)$	1920.43	$5/2^+$			%Iγ=0.0023 *4*
1553.6 *5*	0.199 *10*	(6098.29)	$1/2^+$	4544.49	$(1/2^-,3/2)$			%Iγ=0.0409 *28*
1588.7 *2*	0.30 *2*	3509.18	$(3/2^+)$	1920.43	$5/2^+$			%Iγ=0.062 *5*
1589.9 *5*	0.031 *2*	(6098.29)	$1/2^+$	4508.05	$(1/2,3/2,5/2^+)$			%Iγ=0.0064 *5*
1610.0 *1*	0.53 *4*	1920.43	$5/2^+$	310.41	$3/2^-$			%Iγ=0.109 *10*
1632.0 *1*	0.39 *4*	2324.19	$3/2^{(-)}$	692.32	$3/2^-$			%Iγ=0.080 *9*
1642.9 *5*	0.026 *2*	4544.49	$(1/2^-,3/2)$	2901.81	$(3/2)^+$			%Iγ=0.0054 *5*
1652.0 *2*	0.0031 *11*	2793.00	$5/2^+$	1141.09	$(5/2^-,7/2^-)$			%Iγ=6.4×10^{-4} *23*
1706.4 *2*	0.198 *15*	(6098.29)	$1/2^+$	4391.81	$(3/2)^+$			%Iγ=0.041 *4*

$^{65}_{28}Ni_{37}$-4

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

$\gamma(^{65}Ni)$ (continued)

E_γ[†]	I_γ[†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	Comments
1753.5 *2*	0.250 *14*	(6098.29)	$1/2^+$	4344.64	$1/2^+$			%Iγ=0.051 *4*
1793.8 *5*	0.026 *2*	3962.62	$(3/2^+)$	2168.78				%Iγ=0.0054 *5*
1832.0 *2*	0.039 *4*	3105.67	$(1/2^-,3/2^-)$	1273.65	$(5/2^-)$			%Iγ=0.0080 *9*
1832.7 *5*	0.0076 *10*	4001.47	$(1/2^-,3/2)$	2168.78				%Iγ=0.00156 *22*
1836.4 *3*	0.075 *9*	2146.84	$3/2^-$	310.41	$3/2^-$			%Iγ=0.0154 *20*
1861.6 *2*	0.050 *4*	3279.39	$(3/2)^+$	1417.70	$1/2^-$			%Iγ=0.0103 *10*
1992.8 *4*	0.021 *2*	3410.63	$(3/2^+)$	1417.70	$1/2^-$			%Iγ=0.0043 *5*
2005.5 *4*	0.013 *2*	3279.39	$(3/2)^+$	1273.65	$(5/2^-)$			%Iγ=0.0027 *4*
2013.7 *1*	0.44 *4*	2324.19	$3/2^{(-)}$	310.41	$3/2^-$			%Iγ=0.091 *9*
2033.7 *5*	0.010 *2*	3451.68	$(3/2^+)$	1417.70	$1/2^-$			%Iγ=0.0021 *4*
2083.3 *5*	2.6 *3*	2146.84	$3/2^-$	63.44	$1/2^-$			%Iγ=0.54 *7* Eγ: others: 2083.8 *5* (1972Co31), 2082.7 *10* (1971Ar39). Iγ: others: 2.6 (1972Co31), 2.5 (1971Ar39). Additional information 18.
2096.6 *5*	0.68 *4*	(6098.29)	$1/2^+$	4001.47	$(1/2^-,3/2)$	E1		%Iγ=0.140 *10* (2096.6γ)[3691.0γ](310.45γ)(θ): A_2=+0.02 *2*, A_4=0.00 *2* (2020Po12).
2100.8 *4*	0.031 *4*	2793.00	$5/2^+$	692.32	$3/2^-$			%Iγ=0.0064 *9*
2135.6 *6*	0.41 *2*	(6098.29)	$1/2^+$	3962.62	$(3/2^+)$			%Iγ=0.084 *6*
2146.7 *8*	1.8 *2*	2146.84	$3/2^-$	0.0	$5/2^-$			%Iγ=0.37 *5* Iγ: others: 3.0 *4* (1977Is01), 1.3 (1972Co31). Eγ: others: 2146.7 *5* (1977Is01), 2147.2 *5* (1972Co31). Additional information 19.
2168.7 *2*	0.044 *2*	2168.78		0.0	$5/2^-$			%Iγ=0.0091 *6*
2220 *1*	0.0147 *13*	4544.49	$(1/2^-,3/2)$	2324.19	$3/2^{(-)}$			%Iγ=0.00302 *30*
2244.8 *5*	0.0046 *9*	4391.81	$(3/2)^+$	2146.84	$3/2^-$			%Iγ=9.5×10^{-4} *19*
2260.6 *1*	0.25 *3*	2324.19	$3/2^{(-)}$	63.44	$1/2^-$			%Iγ=0.051 *7*
2324.1 *1*	0.42 *4*	2324.19	$3/2^{(-)}$	0.0	$5/2^-$			%Iγ=0.086 *9*
2338.9 *5*	0.025 *2*	4508.05	$(1/2,3/2,5/2^+)$	2168.78				%Iγ=0.0051 *5*
2397.8 *8*	0.022 *2*	4544.49	$(1/2^-,3/2)$	2146.84	$3/2^-$			%Iγ=0.0045 *5*
2400.7 *1*	1.8 *2*	2711.23	$(3/2^+)$	310.41	$3/2^-$			%Iγ=0.37 *5* Eγ: others: 2401.5 *6* (1977Is01), 2400.5 *10* (1971Ar39). Iγ: others: 2.8 *4* (1977Is01), 1.6 (1971Ar39). Additional information 20.
2471.6 *8*	0.0048 *4*	4391.81	$(3/2)^+$	1920.43	$5/2^+$			%Iγ=9.9×10^{-4} *9*
2482.5 *1*	0.064 *6*	2793.00	$5/2^+$	310.41	$3/2^-$			%Iγ=0.0132 *14*
2545.3 *8*	0.014 *2*	3962.62	$(3/2^+)$	1417.70	$1/2^-$			%Iγ=0.0029 *4*
2589.0 *5*	0.46 *3*	(6098.29)	$1/2^+$	3509.18	$(3/2^+)$	M1+E2	−0.08 *3*	%Iγ=0.095 *8* Other solution for δ is +2.1 *2*. (2589.0γ)[2817.8γ](629.00γ)(θ): A_2=+0.15 *2*, A_4=+0.01 *4* (2020Po12).

$^{65}_{28}Ni_{37}$-5

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

γ(^{65}Ni) (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Comments
2589.6 *8*	0.039 *5*	2901.81	$(3/2)^+$	310.41	$3/2^-$	%Iγ=0.0080 *11*
2646.6 *5*	0.164 *11*	(6098.29)	$1/2^+$	3451.68	$(3/2^+)$	%Iγ=0.0337 *27*
2647.7 *1*	0.71 *7*	2711.23	$(3/2^+)$	63.44	$1/2^-$	%Iγ=0.146 *16* E_γ,I_γ: other: 2647.9 *8* with Iγ=1.1 *2* (1977Is01). Additional information 21.
2687.7 *5*	0.24 *2*	(6098.29)	$1/2^+$	3410.63	$(3/2^+)$	%Iγ=0.049 *5*
2688.9 *3*	0.040 *4*	3962.62	$(3/2^+)$	1273.65	$(5/2^-)$	%Iγ=0.0082 *9*
2704.5 *6*	0.008 *2*	3014.42	$3/2^+$	310.41	$3/2^-$	%Iγ=0.0017 *4*
2718.4 *6*	0.033 *4*	3410.63	$(3/2^+)$	692.32	$3/2^-$	%Iγ=0.0068 *9*
2733.8 *2*	0.0102 *15*	3044.25	$(5/2^+)$	310.41	$3/2^-$	%Iγ=0.00210 *32*
2734.1 *5*	0.0079 *14*	4655.32	$(3/2)^+$	1920.43	$5/2^+$	%Iγ=0.00163 *30*
2759.3 *2*	0.094 *9*	3451.68	$(3/2^+)$	692.32	$3/2^-$	%Iγ=0.0193 *21*
x2810.4# *13*	0.34# *10*					%Iγ=0.070 *21* Additional information 3.
2817.8 *6*	0.111 *10*	3509.18	$(3/2^+)$	692.32	$3/2^-$	%Iγ=0.0228 *23*
2819.2 *5*	0.70 *5*	(6098.29)	$1/2^+$	3279.39	$(3/2)^+$	%Iγ=0.144 *12* E_γ,I_γ: other: 2819.7 *5* with Iγ=0.92 *15* (1977Is01). Additional information 25.
2838.3 *1*	0.066 *6*	2901.81	$(3/2)^+$	63.44	$1/2^-$	%Iγ=0.0136 *14*
2902.2 *3*	0.025 *3*	2901.81	$(3/2)^+$	0.0	$5/2^-$	%Iγ=0.0051 *7*
2927.1 *5*	0.099 *8*	4344.64	$1/2^+$	1417.70	$1/2^-$	%Iγ=0.0204 *19*
2950.9 *2*	0.048 *5*	3014.42	$3/2^+$	63.44	$1/2^-$	%Iγ=0.0099 *11*
2969.1 *2*	0.16 *2*	3279.39	$(3/2)^+$	310.41	$3/2^-$	%Iγ=0.033 *5*
2974.5 *8*	0.025 *2*	4391.81	$(3/2)^+$	1417.70	$1/2^-$	%Iγ=0.0051 *5*
2992.7 *8*	0.036 *4*	(6098.29)	$1/2^+$	3105.67	$(1/2^-,3/2^-)$	%Iγ=0.0074 *9*
3014.3 *2*	0.056 *6*	3014.42	$3/2^+$	0.0	$5/2^-$	%Iγ=0.0115 *14*
3054.4 *8*	0.010 *2*	(6098.29)	$1/2^+$	3044.25	$(5/2^+)$	%Iγ=0.0021 *4*
3084.0 *8*	0.108 *8*	(6098.29)	$1/2^+$	3014.42	$3/2^+$	%Iγ=0.0222 *19* E_γ,I_γ: other: 3088.6 *6* with Iγ=1.26 *19* (1977Is01) is discrepant. Additional information 26.
3100.2 *2*	0.19 *2*	3410.63	$(3/2^+)$	310.41	$3/2^-$	%Iγ=0.039 *5* E_γ,I_γ: other: 3099.8 *13* with Iγ=0.34 *15* (unplaced in 1977Is01). Additional information 22.
3126.7 *6*	0.017 *2*	4544.49	$(1/2^-,3/2)$	1417.70	$1/2^-$	%Iγ=0.0035 *5*
3196.7 *5*	0.126 *9*	(6098.29)	$1/2^+$	2901.81	$(3/2)^+$	%Iγ=0.0259 *22*
3215.9 *2*	0.40 *4*	3279.39	$(3/2)^+$	63.44	$1/2^-$	%Iγ=0.082 *9*
x3219.3# *18*	0.53# *19*					%Iγ=0.11 *4* Additional information 4.
3237.1 *5*	0.021 *2*	4655.32	$(3/2)^+$	1417.70	$1/2^-$	%Iγ=0.0043 *5*
3269.8 *5*	0.022 *3*	3962.62	$(3/2^+)$	692.32	$3/2^-$	%Iγ=0.0045 *7*
3279.2 *2*	0.019 *3*	3279.39	$(3/2)^+$	0.0	$5/2^-$	%Iγ=0.0039 *7*

$^{65}_{28}Ni_{37}$-6

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

γ(^{65}Ni) (continued)

E_γ †	I_γ †@	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	δ‡	Comments
3305.2 *5*	0.099 *8*	(6098.29)	1/2$^+$	2793.00	5/2$^+$			%Iγ=0.0204 *19*
3309.3 *3*	0.23 *2*	4001.47	(1/2$^-$,3/2)	692.32	3/2$^-$			%Iγ=0.047 *5*
3381.9 *5*	0.0087 *13*	4655.32	(3/2)$^+$	1273.65	(5/2$^-$)			%Iγ=0.00179 *28*
3386.8 *3*	3.2 *2*	(6098.29)	1/2$^+$	2711.23	(3/2$^+$)			%Iγ=0.66 *5* E_γ: weighted average of 3387.0 *5* (2020Po12), 3386.7 *3* (1977Is01), and 3387.6 *10* (1971Ar39). I_γ: others: 4.0 *3* (1977Is01), 2.7 (1971Ar39). Additional information 27.
3451.7 *4*	0.024 *3*	3451.68	(3/2$^+$)	0.0	5/2$^-$			%Iγ=0.0049 *7*
3509.0 *2*	0.062 *7*	3509.18	(3/2$^+$)	0.0	5/2$^-$			%Iγ=0.0128 *16*
3652.0 *5*	0.083 *9*	3962.62	(3/2$^+$)	310.41	3/2$^-$			%Iγ=0.0171 *20* E_γ,I_γ: other: 3651.0 *13* with Iγ=0.39 *10* (1977Is01). Additional information 23.
3652.1 *2*	0.106 *10*	4344.64	1/2$^+$	692.32	3/2$^-$			%Iγ=0.0218 *23*
3691.0 *5*	0.35 *4*	4001.47	(1/2$^-$,3/2)	310.41	3/2$^-$			%Iγ=0.072 *9*
3773.7 *3*	1.67 *8*	(6098.29)	1/2$^+$	2324.19	3/2$^{(-)}$	E1+M2	−0.11 *3*	%Iγ=0.344 *23* E_γ: weighted average of 3773.9 *5* (2020Po12), 3773.7 *3* (1977Is01), and 3773.6 *10* (1971Ar39). I_γ: others: 1.55 *15* (1977Is01), 1.4 (1971Ar39). Additional information 28. (3773.9γ)[2013.66γ](310.45γ)(θ): A_2=+0.08 *2*, A_4=+0.03 *2* (2020Po12). (3773.9γ)[1631.97γ](629.00γ)(θ): A_2=+0.15 *2*, A_4=+0.01 *3* (2020Po12).
3851.8 *5*	0.031 *4*	4544.49	(1/2$^-$,3/2)	692.32	3/2$^-$			%Iγ=0.0064 *9*
x3852.8# *10*	0.49# *10*							%Iγ=0.101 *21* Additional information 5.
3937.6 *5*	0.039 *5*	4001.47	(1/2$^-$,3/2)	63.44	1/2$^-$			%Iγ=0.0080 *11*
3951.3 *2*	5.6 *4*	(6098.29)	1/2$^+$	2146.84	3/2$^-$	E1+M2	−0.13 *7*	%Iγ=1.15 *10* E_γ: weighted average of 3951.5 *5* (2020Po12), 3951.4 *2* (1977Is01), 3950.2 *6* (1972Co31), and 3951.0 *10* (1971Ar39). I_γ: others: 5.4 *4* (1977Is01), 4.8 (1972Co31), 4.1 (1971Ar39). Additional information 29. (3951.5γ)[1836.4γ](310.45γ)(θ): A_2=+0.06 *2*, A_4=+0.05 *3* (2020Po12). (3951.5γ)[1454.5γ](629.00γ)(θ): A_2=+0.13 *2*, A_4=+0.04 *3* (2020Po12). Circular polarization R=−1.1 *10* (1978Ve06).
3962.8 *5*	0.19 *2*	3962.62	(3/2$^+$)	0.0	5/2$^-$			%Iγ=0.039 *5* E_γ,I_γ: other: 3963.1 *13* with Iγ=0.39 *10* (1977Is01). Additional information 24.
4000.8 *5*	0.014 *2*	4001.47	(1/2$^-$,3/2)	0.0	5/2$^-$			%Iγ=0.0029 *4*
4033.7 *5*	0.054 *6*	4344.64	1/2$^+$	310.41	3/2$^-$			%Iγ=0.0111 *13*
4080.8 *5*	0.024 *3*	4391.81	(3/2)$^+$	310.41	3/2$^-$			%Iγ=0.0049 *7*
4177.0 *7*	0.70 *5*	(6098.29)	1/2$^+$	1920.43	5/2$^+$			%Iγ=0.144 *12*

$^{65}_{28}Ni_{37}$-7

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

γ(^{65}Ni) (continued)

E_γ [†]	I_γ [†@]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
							E_γ: weighted average of 4177.8 *8* (2020Po12) and 4178.1 *7* (1977Is01). I_γ: other: 0.58 *10* (1977Is01). Additional information 30.
4233.5 *8*	0.063 *7*	4544.49	(1/2$^-$,3/2)	310.41	3/2$^-$		%Iγ=0.0130 *16*
4345.2 *5*	0.090 *10*	4655.32	(3/2)$^+$	310.41	3/2$^-$		%Iγ=0.0185 *22*
4391.6 *5*	0.117 *13*	4391.81	(3/2)$^+$	0.0	5/2$^-$		%Iγ=0.0241 *29*
4544.3 *5*	0.024 *3*	4544.49	(1/2$^-$,3/2)	0.0	5/2$^-$		%Iγ=0.0049 *7*
4655.5 *5*	0.091 *11*	4655.32	(3/2)$^+$	0.0	5/2$^-$		%Iγ=0.0187 *24*
4680.2 *3*	17 *2*	(6098.29)	1/2$^+$	1417.70	1/2$^-$		%Iγ=3.5 *4* E_γ: weighted aveage of 4680.3 *5* (2020Po12), 4680.3 *3* (1977Is01), 4679.5 *6* (1972Co31), and 4681.0 *10* (1971Ar39). I_γ: others: 18.4 *10* (1977Is01), 16.5 (1972Co31), 13 (1971Ar39). Additional information 31. Circular polarization R=1.4 *4* (1978Ve06).
[x]4730.2[#] *19*	0.29[#] *10*						%Iγ=0.060 *21* Additional information 6.
5405.8 *1*	46 *6*	(6098.29)	1/2$^+$	692.32	3/2$^-$	E1	%Iγ=9.5 *12* E_γ: from 1977Is01. Others: 5405.6 *3* (2020Po12), 5405.2 *6* (1972Co31), 5405.7 *10* (1971Ar39). I_γ: others: 43.1 *25* (1977Is01), 40 (1972Co31), 31 (1971Ar39). Additional information 32. Mult.: δ(M2/E1)=0.00 *5* assumed by authors (2020Po12). (5405.6γ)(629.00γ)(θ): A_2=+0.213 *10*, A_4=−0.02 *2* (2020Po12). (5405.6γ)(692.42γ)(θ): A_2=+0.066 *10*, A_4=+0.005 *14* (2020Po12). Circular polarization R=−0.53 *19* (1978Ve06).
[x]5419.9[#] *17*	0.68[#] *24*						%Iγ=0.14 *5* Additional information 7.
[x]5752.7[#] *23*	0.39[#] *15*						%Iγ=0.080 *31* Additional information 8.
5787.7 *5*	86 *12*	(6098.29)	1/2$^+$	310.41	3/2$^-$	E1	%Iγ=17.7 *22* E_γ: from 1977Is01. Others: 5787.7 *5* (2020Po12), 5787.1 *6* (1972Co31), 5788.2 *10* (1971Ar39). I_γ: others: 86 *4* (1977Is01), 78 (1972Co31), 64 (1971Ar39). Additional information 33. Mult.: δ(M2/E1)=0.00 *5* assumed by authors (2020Po12). (5787.7γ)(310.45γ)(θ): A_2=+0.171 *2*, A_4=−0.004 *4* (2020Po12). Circular polarization R=−0.64 *11* (1978Ve06).
6034.7 *2*	322 *17*	(6098.29)	1/2$^+$	63.44	1/2$^-$		%Iγ=66.2 *22* E_γ: weighted average of 6034.8 *5* (2020Po12), 6034.8 *2* (1977Is01), 6034.0 *6* (1972Co31), and 6035.0 *10* (1971Ar39).

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06 (continued)

$\gamma(^{65}Ni)$ (continued)

E_γ [†]	E_i(level)	Comments
		I_γ: from 1977Is01, renormalized from original %Iγ=66.5 *35* using %Iγ(5788γ)=17.7 *9* in 1977Is01 and relative Iγ(5788γ)=86 *12* in 2020Po12. Others: 304 (1972Co31), 230 (1971Ar39). Intensity is not given by 2020Po12, as this γ is not seen in $\gamma\gamma$-coincidence. Additional information 34. Circular polarization R=1.00 *5* (value used in calibration, 1978Ve06).

† From 2020Po12 with intensity from $\gamma\gamma$-coin data, unless otherwise noted. Quoted values of intensities are relative to Iγ(310γ)=100. Original values in 1977Is01, 1972Co31, 1971Ar39 are absolute intensities per 100 neutron captures and have been renormalized by the evaluator to Iγ(310γ)=100, as quoted in comments. Note that since Iγ(310γ) is not reported in 1977Is01 and Iγ(6035) is not available in 2020Po12, the evaluator has used Iγ(5788γ) available in both 1977Is01 and 2020Po12 for renormalization.

‡ As given by 2020Po12, based on their $\gamma\gamma(\theta)$ data, γ(circ, pol), and proposed level scheme, with weak E2 or M2 admixture given in parentheses, even though δ(Q/D) does not overlap zero. When the Mult assignments are consided in Adopted Gammas, the firm assignments of magnetic or electric characters will be placed in parenthsises if there are no other strong supporting arguments, since $\gamma\gamma(\theta)$ data don′t give assignments of magnetic or electric characters.

From 1977Is01 only.

@ For intensity per 100 neutron captures, multiply by 0.206 *9*.

& Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with "Frozen Orbitals" approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

a Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

$^{65}_{28}Ni_{37}$-9

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06

Level Scheme

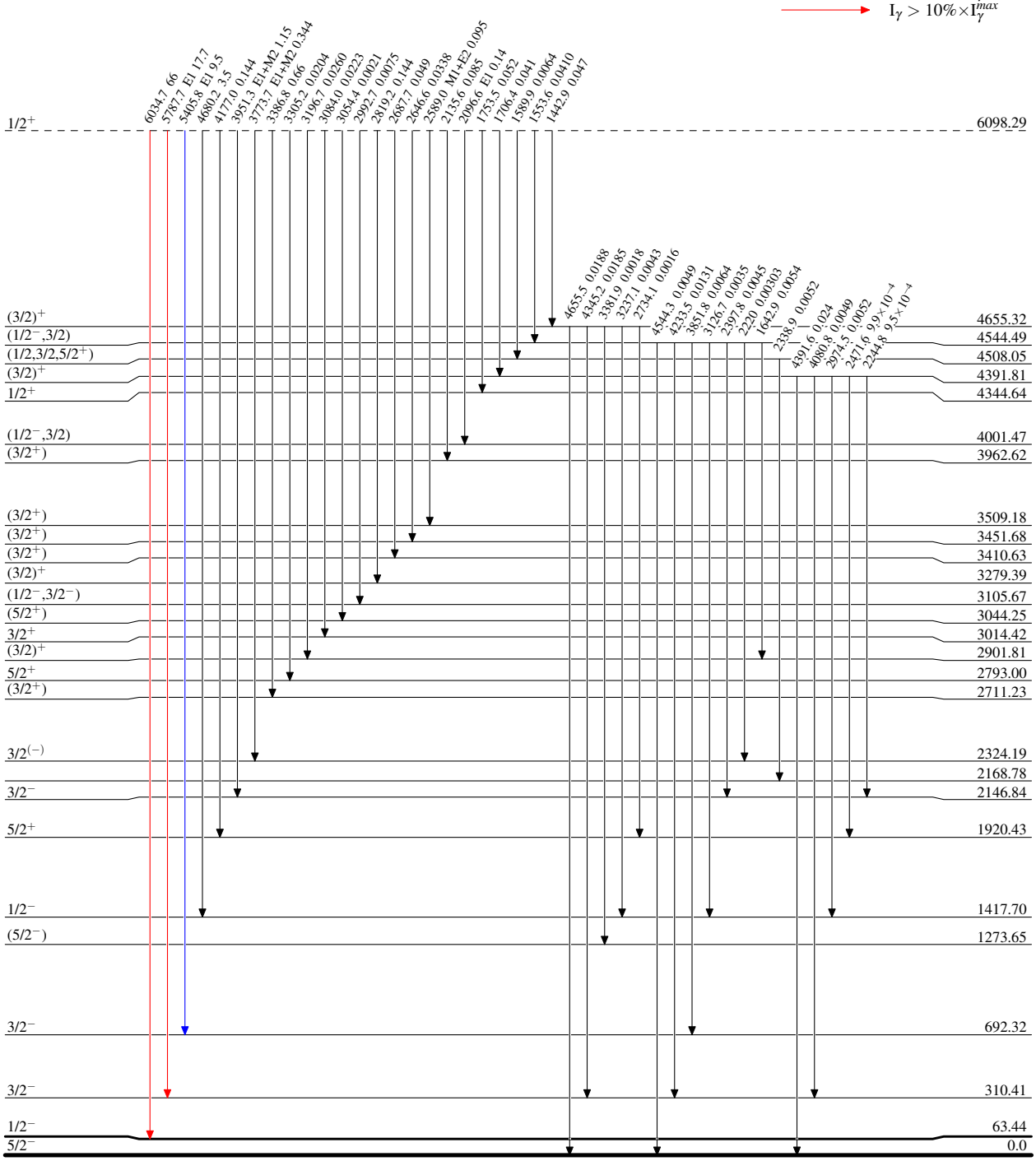
Intensities: Intensity per 100 neutron captures

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{65}_{28}Ni_{37}$

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06

Level Scheme (continued)

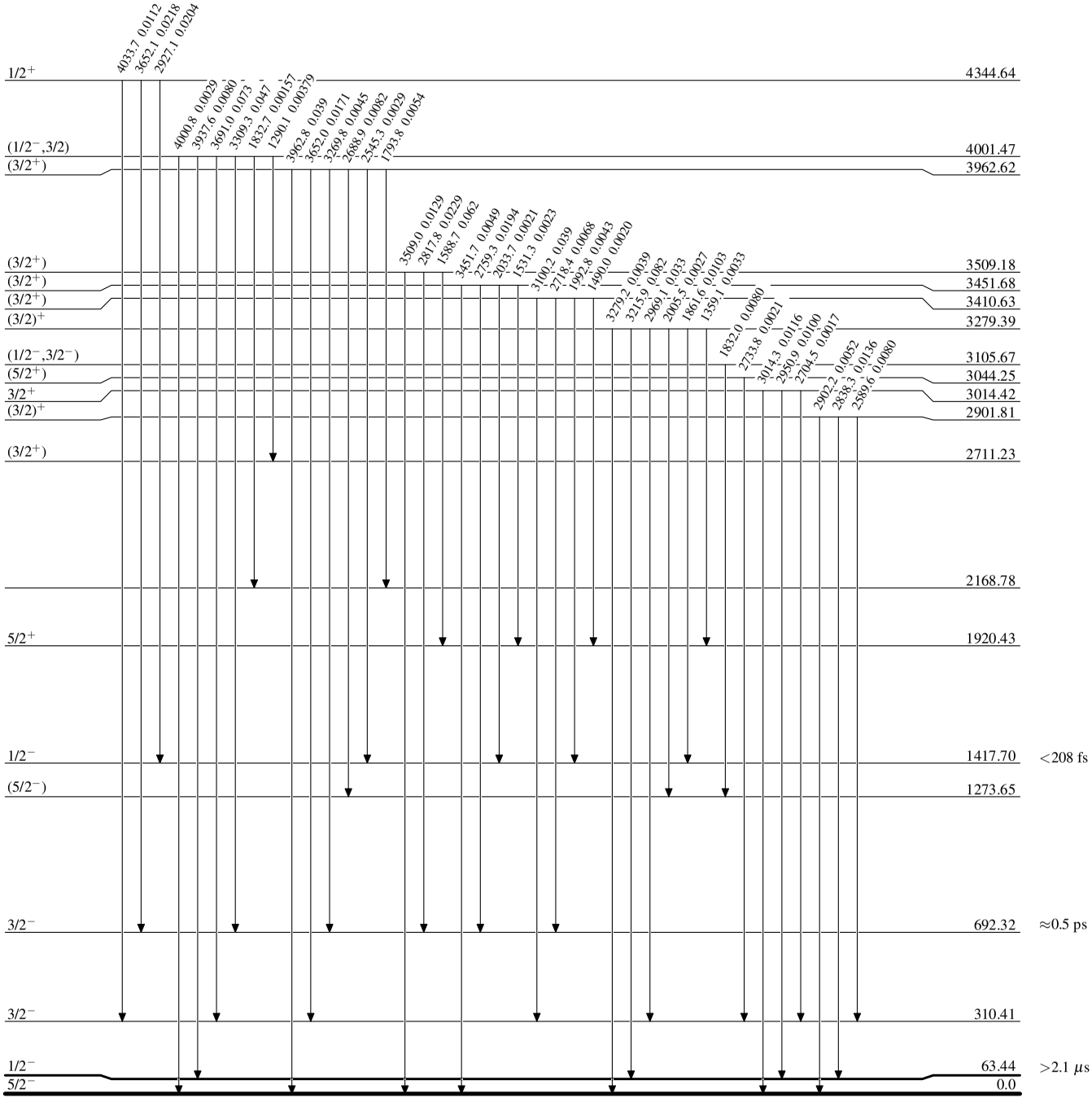
Intensities: Intensity per 100 neutron captures

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

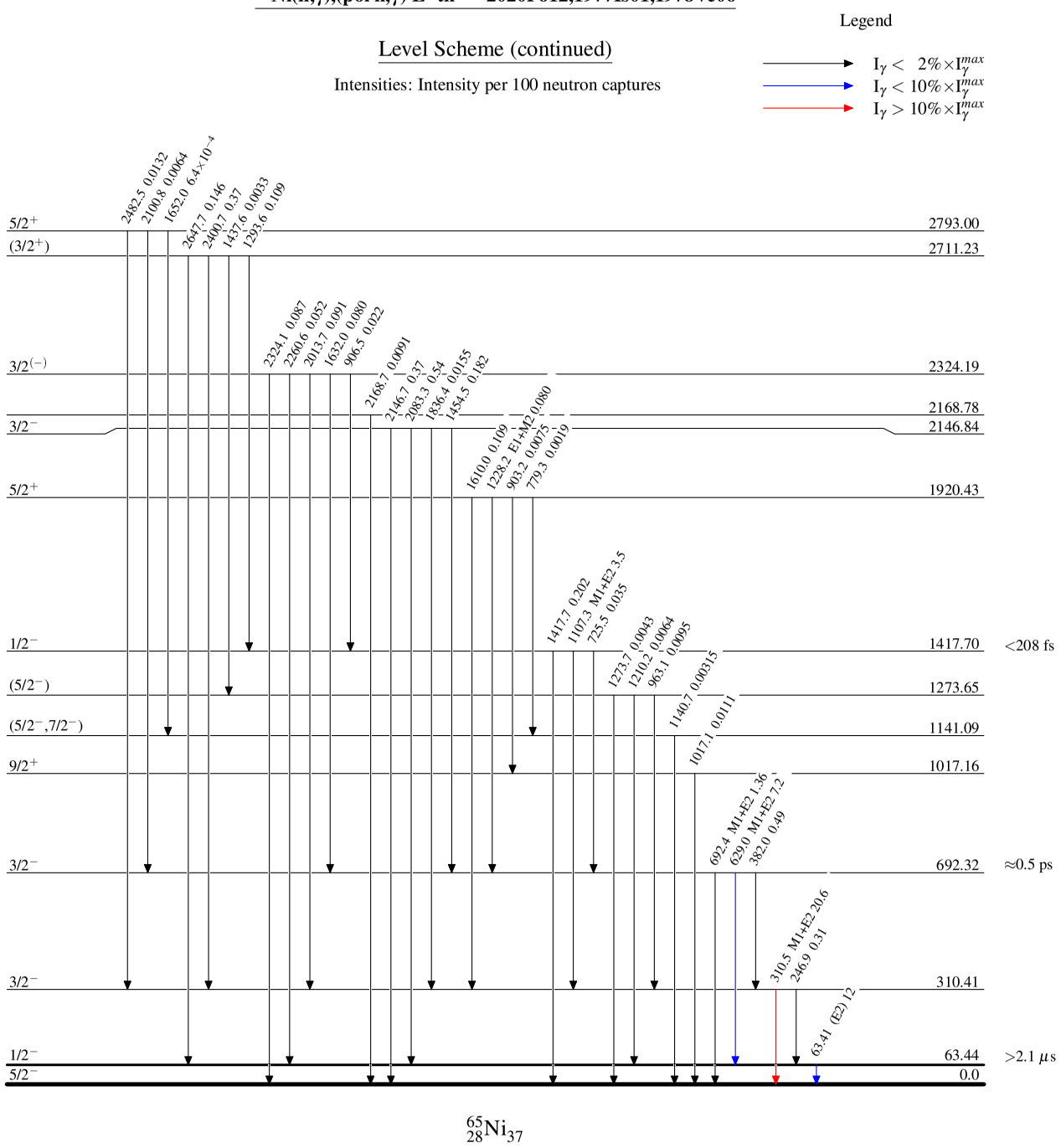


$^{65}_{28}Ni_{37}$

^{64}Ni(n,γ),(pol n,γ) E=th 2020Po12,1977Is01,1978Ve06

Level Scheme (continued)

Intensities: Intensity per 100 neutron captures



$^{65}_{28}Ni_{37}$